

Support Material for Standard B-2

A. Supporting Content Web Sites

Thinkquest's Cellupedia

<http://library.thinkquest.org/C004535>

Cellupedia includes information about the basic characteristics of cells, types of cells, cell anatomy, and cell processes. It includes images and an interactive timeline about the history of cells and the technology used to study them.

Indicators: B-2.1, B-2.2, B-2.3

Incredible Megacell Game

http://nobelprize.org/educational_games/medicine/cell/

This comic book style adventure challenges students to put Megacell's organelles back in after he has fallen in an ultracentrifuge. They must save his life using their knowledge of each organelle's function.

B-2.1

Thinkquest's The Cell

<http://library.advanced.org/3564/>

The Cell includes a 3-D video clip of an animated cell as well as a gallery of images of real cells and cell structures. Other features include lessons about the cell, a JavaScript enabled DNA to protein translator, quizzes, and other features.

Indicator: B-2.2

The Biology Project – Cell Biology

http://www.biology.arizona.edu/CELL_BIO/cell_bio.html

The site provides tutorials on cellular studies, cell signaling, the cell cycle and mitosis, meiosis, and the cytoskeleton. Problem sets are included to provide practice with each major concept.

Indicators: B-2.1, B-2.2, B-2.3, B-2.5, B-2.6, B-2.7

An Online Biology Book

<http://www.emc.maricopa.edu/faculty/farabee/biobk/BioBookTOC.html>

This free online biology textbook provides information, graphics, and animations on cellular organization, cell transport, mitosis, meiosis, reactions and enzymes.

Indicators: B-2.1, B-2.2, B-2.3, B-2.4, B-2.5, B-2.6, B-2.7, B-2.8

Molecular Expressions Cell Biology: Structure of Cells and Viruses

<http://micro.magnet.fsu.edu/cells/index.html>

This site includes information, graphics, movies, and java simulations dealing with cellular structure, cellular motion, microscopy, cell reproduction, and cellular digestion and the secretory pathway.

Indicators: B-2.2, B-2.3, B-2.6

The Control Center of the Cell Game

http://nobelprize.org/educational_games/medicine/2001/

This game challenges students to direct a cell through the steps and checkpoints of mitosis.

Indicator: B-2.6, B-2.7

The Biology Project – Biochemistry

<http://www.biology.arizona.edu/biochemistry/biochemistry.html>

Includes tutorials on the biochemical processes that occur in cells and conditions which can alter these reactions.

Indicator: B-2.7

Time.com – Stem Cells

<http://www.time.com/time/2001/stemcells/#>

A site about the stem cell debate that includes articles, interviews, basic information about how it works, common questions, and additional resources on the subject.

Indicator: B-2.7

Cell Biology and Cancer

<http://science.education.nih.gov/supplements/nih1/cancer/default.htm>

Contains movies and activities for students and lesson plans for teachers on the subject of cancer.
B-2.7

B. Suggested Literature – all books came from NSTA’s recommended lists of books.

Amato, I (2002). *Science Pathways of Discovery*. New York, NY: John Wiley and Sons.

ISBN: 047105660X

Lexile Level: Not rated but publisher recommends it for 5th through 12th grade level readers.

Description: This book discusses a wide variety of complex scientific topics through essays written by experts in their fields. These include topics such as cell theory and cloning that would be relevant to teaching about the cell but include other important concepts from other branches of science as well such as the Big Bang theory.

Indicator: B-2.1, B-2.4

Morgan, S (2006). *Life Science in Depth: Cells and Cell Function*. Chicago, IL: Heinemann Library.

ISBN: 1403475202

Lexile Level: Not rated but publisher recommends it for 5th – 8th grade level readers.

Description: The book includes pictures of cells and cell structures as well as text that is written in terms that is understandable to students. The book makes the information relevant by including current events such as explaining how “Dolly” the sheep was cloned.

Indicator: B-2.2

Elson, C (1996). *The Biology Illustrated Coloring and Resource Book*. Napa, CA: Coloring Concepts.

ISBN: 0965231569

Lexile Level: Not rated but publisher recommends it for 5th to 12th grade level readers.

Description: Along with other biological concepts there are sections on microscopes and cells. Students have to read carefully in order to color it according to directions that accompany each black line image.

Indicator: B-2.2, B-2.3, B-2.6

Carlson, . (Ed.). (2002). *Scientific American: The Amateur Biologist*. New York, NY: John Wiley and Sons, Inc..

ISBN: 0-471-38281-7

Lexile Level: Not rated but publisher recommends it for 5th to 12th grade readers.

Description: Teachers that want to improve their content knowledge and students that want to do their own projects will find this book useful. Using simple instructions and easy to obtain materials readers can for example study cells after making their own video microscopes.

Indicator: B-2.2, B-2.8

Silverstein, A, Silverstein, V, & Silverstein Nunn, L Kardos, T (1996). *75 Easy Life Science Demonstrations*. Portland, ME: Walch Publishing.

ISBN: 0-8251-2854-4

Lexile Level: Not rated but publisher recommends it for middle school level readers.

Description: Includes easy to set-up demonstrations for the classroom or for student projects. Some of these relate directly to the study of cells such as making a cell model, diffusion, chlorophyll, photosynthesis, cell division and differentiation through seed growth, and more.

Indicator: B-2.2, B-2.4, B-2.5, B-2.8

(2002). *Science Concepts: Cells*. Frederick, MD: Twenty-First Century Books.

ISBN: 076132254X

Lexile Level: Not rated; recommended by publisher for 5th – 12th grade.

Description: This book is makes the study of cells relevant for students color graphics, pictures, and micrographs and topics in each chapter that connect cell biology topics to the visible world and current topics such as cloning and stem cell research.

Indicator: B-2.2, B-2.4, B-2.6

Kramer, S (2001). *Hidden Worlds: Looking Through a Scientist's Microscope*. Boston: Houghton Mifflin Co.

ISBN: 0-309-07630-7

Lexile Level: 1040L

Description: This book is excellent for those students reading below grade level as it is written at a 5th to 8th grade level but all students will find the large number of photos taken through microscopes engaging.

Indicator: B-2.4

Maienschein, J. (2003). *Whose View of Life? Embryos, Cloning, and Stem Cells*. Cambridge, MA: Harvard University Press.

ISBN: 0674011708

Lexile Level: Not rated but publisher recommends it for 9th grade through college.

Description: This book seeks to tackle the toughest questions that scientists and citizens face regarding controversial research that could help many with medical issues such as spinal cord

issues, Alzheimer's disease, diabetes, and Parkinson's disease. Written for 9th grade through college level students, it is a useful book for teachers to expand their content knowledge and for older and advanced students when doing research projects.

Indicator: B-2.4

Parson, A (2004). *Proteus Effect: Stem Cells and Their Promise for Medicine*. Washington, DC: The National Academies Press.

ISBN: 0309089883

Lexile Level: Not rates but recommended for grades 9 through college.

Description: The debate over stem cell research is probably the most topical scientific controversy of our time. In addition to providing background knowledge of the topic and controversies it also looks at it's history going back to the 18th century as well as the art and politics behind the subject.

Indicator: B-2.4

Silverstein, A, Silverstein, V, & Silverstein Nunn, L (2005). *Cancer*. Minneapolis, MN: Lerner Publications Co.

ISBN: 0761328335

Lexile Level: Not rated but publisher recommends it for students reading on the 5th to 8th grade level.

Description: Can be used to bring relevance to lessons on cancer. The book includes information on the types of cancer, diagnosis, and treatment of the disease through the personal stories of individuals.

Indicator: B-2.7

C. Suggested ETV Streamline SC or ITV Video Resources:

1. Video Title: Living Cell, The.
Video segment: Discovering cells
Resource: ETV Streamline SC
Segment time: 6:25 to 8:02
Description: Basic information on the cell theory and its important historical figures.
Indicator: B-2.1
2. Video Title: Understanding Cells
Video Segment: Lesson One – Life and Cells
Resource: ETV Streamline SC
Segment time: 0:00 to 12:06
Description: Describes the characteristics of life, that all things are made up of cells, and that they are the basic unit of life. This segment also explains how cells become differentiated and make up tissues and tissues make up organs and organ systems.
Indicators: B-2.1, and B-2.4
3. Video Title: Living Cell, The
Video segment: Parts of a Cell

Resource: ETV Streamline SC

Segment time: 10:07 to 12:48

Description: A basic description of the major structures found in a cell and their functions.

Indicator: B-2.2

4. Video Title: Understanding Cells

Video Segment: Lesson Two – How Cells Work

Resource: ETV Streamline SC

Segment time: 12:07 to 28:15

Description: Identifies and description the structures and functions of the major organelles.

Special emphasis is given to the organelles involved in the transformation of energy, protein synthesis, and the genetic control of the cell.

Indicator: B-2.2

5. Video Title: Living Cell, The

Video Segment: Plant and Animal Cells

Resource: ETV Streamline SC

Segment Time: 8:03 to 10:06

Description: This segment describes the difference between plant and animal cells and also describes the basic difference between eukaryotes and prokaryotes.

Indicator: B-2.2 & B-2.3

6. Video Title: Living Cell, The

Video Segment: Cells with no nucleus

Resource: ETV Streamline SC

Segment Time: 13:16 to 14:16

Description: This segment describes the major characteristics of prokaryotes.

Indicator: B-2.3

7. Video Title: Greatest Discoveries with Bill Nye: Biology

Video Segment: The Science of Microbiology

Resource: ETV Streamline SC

Segment Time: 0:00 – 10:07

Description: This history of the discovery of cells and the basic difference between prokaryotes and eukaryotes. A section on the discovery of archae highlights this new classification of prokaryotic organisms.

Indicator: B-2.1 to B-2.3

8. Video Title: Living Cell, The

Video Segment: Diffusion and Osmosis

Resource: ETV Streamline SC

Segment Time: 14:17 to 16:30

Description: Explains the processes by which active, passive, and facilitated diffusion impact how things enter and leave the cell as part of homeostasis.

Indicator: B-2.5

9. Video Title: Simply Science: Maintaining Equilibrium
Video Segments: Equilibrium, tonicity, and dynamic equilibrium
Resource: ETV Streamline SC
Segment Time: 0:00 – 17:24
Description: Active, passive and facilitated transport is explained with real world examples and lab demonstrations.
Indicator: B-2.5
10. Video Title: Biologix: Cell Cycle Mitosis and Cytoplasmic Division
Video Segments: Life Cycle of Cell and Cell Division
Resource: ETV Streamline SC
Segment Time: 4:22 – 29:00
Description: In depth description of the cell cycle and cytoplasmic division. Includes student discussions with scientists and explores current research. Compares normal cells to cells that are aging or that abnormal, such as cancer cells and explains how cancer is detected and treated.
Indicators: B-2.6 and B-2.7
11. Video Title: Physical Science Series: Chemical Reactions
Video Segment: Rates of Chemical Reactions
Resource: ETV Streamline SC
Segment Time: 12:00 – 13:50
Description: Discusses how temperature, surface area, concentration, and enzymes as catalysts affect the rates of chemical reactions.
Indicator: B-2.8

D. Career Connections:

Clinical laboratory technologists

Clinical laboratory technologists work in medical settings and research facilities where they use complex laboratory procedures to prepare and analyze samples of body tissues and fluids. They use their knowledge of biology and chemistry to cross match blood, and prepare cultures and look for causes of disease such as bacteria, fungi, protists, and other microorganisms.

Medical Scientists

Medical Scientists perform research to improve human health. They research a wide variety of things that cause disease and ways to help people stay healthy. They study the biochemistry of the body, genetics, cell function, and how this impacts the tissues and organs that make up the systems of the body. Medical Scientists may work in research hospitals, universities, public research laboratories, and for private research companies.

Veterinarians

Many veterinarians with their own practices do some of their own diagnostic laboratory tests on blood and cellular tissues and fluids. They are also needed to work in other areas where animals are kept such as zoos, aquariums, wildlife preserves, and livestock lots where they work to keep

animals healthy but may also serve as inspectors to make sure regulations are followed to protect the animals and to protect humans from diseases that can be transmitted by animals.

Microbiologists

Microbiologists work in a variety of fields using their knowledge of how bacteria and other microbes function. Some work with companies to ensure their products are safe to use such as in the cosmetics industry and food industry. Others make work in the pharmaceutical and biotech industries to research new ways to treat and prevent disease.